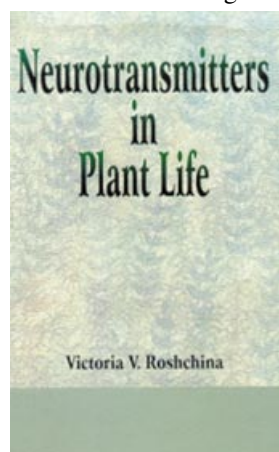


doi:10.1093/aob/mcg113



Neurotransmitters in plant life.

Roshchina VV. 2001.
Enfield: Science Publishers,
Inc. \$87.50. 292 pp.

The prevailing common knowledge says that animals, and especially mammals, use hormones to coordinate biochemical activities of different types of cells, while neuromediators serve as signalling molecules for communication within the animal's body and with the outside world. On the

other hand, higher plants utilize hormone-like substances to coordinate their growth and development, but they lack the sophisticated systems for integrative processing and exchange of information. Is it true or false?

This book by Victoria V. Roshchina is probably one of the first attempts to change this predominant view. The title grabs the reader's imagination and, right from the start, the book demonstrates that not only are animal neurotransmitting molecules (acetylcholine, serotonin, histamine and catecholamines, e.g. dopamine, adrenaline or noradrenaline) present in higher and lower plants, as well as in fungi, but their anabolic and catabolic enzymes are also present. It is worth mentioning here that acetylcholine and histamine were in fact first identified in fungal cells, and it was not until much later that they were discovered in animal cells. In the second chapter, Roshchina describes plant responses to neuromediators and their agonists and antagonists, ranging from changes in growth and developmental patterns through membrane processes, to energetic and metabolic reactions. In the third chapter, an attempt is made to relate data, from animals, on regulatory systems that involve neuromediators to observations coming from plants. The final chapters present a more general overview of the possible functions of neurotransmitters in plants, with some additional remarks on putative evolutionary events and on the prospective practical use of plant neuromediators.

Neurotransmitters in plant life could be an excellent starting point for anyone looking for a detailed and in-depth

review of all available data on the occurrence, distribution and general physiological activity of several so-called neuromediators, recognized a long time ago by pharmacology, but not enjoying wider attention in mainstream plant biochemistry and physiology. The usefulness of the book is increased further because a significant proportion of information is taken from papers published in less well known and less easily accessible journals, and the references cited span a period of more than 50 years. The original version of this book, in Russian, was published in 1991, while the English translation came 10 years later. It is a pity that during translation no attempt was made to update the contents or to include at least some molecular data derived from recent genomic and proteomic approaches. In effect, many of interpretations contained in this book, e.g. on microtubules in chloroplasts (p. 180), seem too far-reaching as they are not grounded in solid molecular and biochemical evidence and do not take into account issues related to compartmentation and localization of bioactive molecules. Such an update could also provide a much broader view of the general role of low molecular weight compounds in plants, because, reading this book, one has to constantly remind oneself that the book is devoted to a tiny proportion of plant compounds with biological activities.

Having read this book I was slightly disappointed that the data presented and resulting conclusions did not match the promise of the title. The brunt of the criticism should be directed at the publishers. First, the quality of translation is rather poor, with some unusual wordings, making it difficult to understand some sentences. From a biochemical point of view, no attempt has been made to quote quantitative data using identical units, and in one or two cases concentrations were even cited incorrectly as amounts (see, for example, p. 70). There are problems with chemical nomenclature, e.g. serotonin is identified as 5-oxytryptamine (p. 34) or 5-hydroxytryptamine (p. 39), while its antagonist is described as trifluoperazine (p. 65) or trifluoroperazine (p. 66). Careful reading also reveals some fundamental mistakes, e.g. on p. 151 one reads: 'Antagonists are represented by complex phenolic compounds, in particular alkaloid yohimbine (Fig. 48)'. This single sentence violates the generally accepted definitions of both phenolics (compounds based on 6-carbon rings) and alkaloids (molecules containing nitrogen).

Despite its shortcomings, this book deserves to be recommended. It serves as a timely reminder that simple molecules, such as biogenic amines and many others, were not 'invented' by animals, but that their origin dates back long before the diversification of plant and animal evolutionary lineages (Kushiro *et al.*, 2003). It also reminds us that playing with words and general terms, in this case 'neuromediators', might be a dangerous game of asking the wrong questions and losing the right answers.

Przemysław Wojtaszek

© 2003 Annals of Botany Company

LITERATURE CITED

Kushiro T, Nambara E, McCourt P. 2003. The key to signalling. *Nature* 422: 122.